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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,496	07/30/2003	Lateef A. Kajouke	GP-303030	9686

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EXAMINER	
CAVALLARI, DANIEL J	
ART UNIT	**PAPER NUMBER**
2836	

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/630,496	KAJOUKE ET AL.	
	Examiner	Art Unit	
	Daniel J. Cavallari	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

The abstract of the disclosure is objected to because it exceeds 150 words in length. The abstract was counted at 174 words. Correction is required. See MPEP § 608.01(b).

Claim Objections

Claim 6 is objected to because of the following informalities:

Claim 6 recites the limitation "... further comprising the voltage source..." however "a voltage source" is not previously disclosed therefore there is insufficient antecedent basis for this limitation in the claim.

The claim will be examined as best understood to mean "a voltage source".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 includes the limitation of "switched inductors". It is unclear what constitutes a "switched inductor" as an inductor is not a switching device. The specification discloses branches (16 & 18) comprising inductors (L1 & L2) and switches (S1 & S2) however this does not constitute a "switched inductor". The claim will be examined as best understood in which "switched inductor" is read on as an inductor with a coupled switched.

Claims 1, 14, and 22 recite the limitation of "...a plurality of balancing switches configured to be actively driven to provide a DC voltage to the load and to balance energy between said current section and said voltage section when said power conversion circuit is in a no-load condition...". It is unclear what constitutes a "no-load condition" and it is also confusing what constitutes as "balancing energy". The "current section" and the "voltage section" neither contain a power supply so it is unclear how energy is "balanced" between them. The "no-load condition" is confusing as a load is previously disclosed as "electrically coupled" to the secondary windings of the transformer therefore it is unclear how and when a "no-load" condition is created.

The claim will be examined as best understood in which "...to balance energy between said current section and said voltage section when said power conversion circuit is in a no-load condition and operated in the forward direction" is taken to mean "...to stabilize the voltage of the power conversion circuit when the power conversion circuit is operated in the forward direction".

Claim 10 contains the limitation of "...a vehicle chassis or portion thereof". The limitation "a portion thereof" is not clear. The claim will be examined as best understood in which the limitation reads "... connected to a vehicle chassis".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Claims 1, 5-9, 14, 22, and 26-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhu (US 2003/0002304).

Zhu et al. (*hereinafter referred to as Zhu*) teaches:

In regard to Claims 1, 14, & 22

- A current section (read on by the current current-fed side of the transformer) (See Paragraph 31-32) comprising switched inductors (L1 & L2) configured to produce a boosted output voltage (See Paragraph 40) from a voltage source (Vb) when operated in a forward direction (See Figure 10)
- A transformer (T) having a primary winding electrically coupled to the boosted output (A & B) (See Figure 10) and a secondary winding (See Paragraph 40)
- A voltage section (read on by the voltage-fed side of the transformer) (See Paragraph 31-32) coupled to the secondary windings (See Figure 10) comprising a plurality of switches (S3-S6) configured to be actively driven to provide a DC

voltage, read on by switches (S3-S6) that, when operated in buck mode, act as an inverter to produce a DC output (See Paragraph 40)

- The switches (S3-S6) stabilize the voltage of the power conversion circuit when the power conversion circuit is operated in the forward direction, read on by shorting the secondary side of the transformer (T) in order to stabilize the circuit against voltage spikes (See Paragraph 44).
- Zhu teaches the current section comprising switched circuit branches wherein each branch has an inductor (L1 & L2) and a branch switch (S1& S2) respectively.

In regard to Claims 5 & 9

- A common ground (N) wherein said current section is connected to the common ground (N) and the voltage section is electrically isolated from the ground (N) (See Figure 1 & Paragraph 42)

In regard to Claim 6

- The power conversion circuit comprising a rechargeable battery (See Paragraph 31 and the battery source (20) of Figure 10 and Paragraphs 39).

In regard to Claim 7, 28, 29

- The power conversion circuit comprising a fuel cell of a vehicle electrically coupled to the voltage section and configured to receive an initial operating voltage (See Paragraph 31 and the load (22) of Figure 10 and Paragraphs 36 & 39).

In regard to Claims 8, 26, & 27

- The current section configured to operate as a rectifier in a reverse direction and the voltage section configured to operate as a buck converter in a reverse direction when the fuel cell is operating to recharge the battery (20), read on by the condition in which Vo is powering Vb (See Figure 1 & Paragraph 40)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 11, 15, 23, & 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu and Welches et al. (US 2003/0012038).

Zhu teaches the current section comprising switched circuit branches wherein each branch has an inductor (L1 & L2) and a branch switch (S1& S2) respectively but fails to explicitly teach a control circuit to operate the semiconductor switches of the circuit. Although Zhu teaches controlling the switches with control signals (See Figure 2). Zhu fails to teach the control circuit which produces these signals.

Welches et al. teaches a power conversion circuit that incorporates a controller comprising of circuit (295) and a PWM integrated circuit (See Paragraph 83) used to control semiconductor switches (S1-S5) of an inverter (70) and the switches of the main converter (40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the controller taught by Welches et al. in which to control the switches taught by Zhu. The motivation would have been to provide circuitry capable of providing the necessary switching signals (See Zhu, Figure 2) to operate the power conversion circuitry.

Zhu further teaches:

In regard to Claims 3, 4, 12, 13, 16, 17, 20, 24, 25, 31, & 32

- Switching a first and second subset (S1 & S6) & (S2 & S7) respectively, in a complementary fashion wherein the specification defines complementary as (oppositely and either simultaneously or nearly simultaneously, See Page 8) and read on by the opposite switching that takes place of switches (S1 & S6) and (S2 & S7) during the timer interval between t6 and t8 in which the switches S1 & S2 are turned off and switches S6 & S7 are turned on (See Figure 2).

In regard to Claim 18

- The current section configured to operate as a rectifier in a reverse direction and the voltage section configured to operate as a buck converter in a reverse direction when the fuel cell is operating to recharge the battery (20), read on by the condition in which Vo is powering Vb (See Figure 1 & Paragraph 40)

In regard to Claim 19

- The power conversion circuit comprising a rechargeable battery (See Paragraph 31 and the battery source (20) of Figure 10 and Paragraph 39).

In regard to Claims 20 & 21

- The power conversion circuit comprising a fuel cell electrically coupled to the voltage section and configured to receive an initial operating voltage (See Paragraph 31 and the load (22) of Figure 10 and Paragraph 39) and recharge the battery source (20) when operated in a reverse direction (See Paragraph 31 and the battery source (20) of Figure 10 and Paragraph 39).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu and Beeson et al. (6,222,443)

Zhu teaches a common ground (N) wherein said current section is connected to the common ground (N) which is coupled with a battery (Vb) negative terminal (See Figure 1 & Paragraph 42). Zhu fails to teach the ground connected to a vehicle chassis.

Beeson et al. teaches an electrical system connected with the system's ground potential which is connected to the vehicle chassis and the negative terminal of the vehicles battery (See Figure 2 & 3 and Column 9, Lines 11-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the ground (N) taught by Zhu, which is also attached to the battery's (Vb) negative terminal, to the vehicle chassis, as taught by Beeson et al. The motivation would have been to provide a sufficient ground potential for the system while saving money and material by utilizing the vehicle chassis as opposed to providing an additional vehicle grounding system.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Zhu et al. (US 2002/0159280 A1) teaches a power converter circuit incorporating a PWM controller (90) (See Figure 2), a fuel cell and a buck-boost converter (See Paragraph 33).
- Welches et al. (US 2003/0012038 A1) teaches a power converter circuit which includes a fuel cell (See Paragraph 68) and converters (See Figure 1)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Cavallari whose telephone number is (571)272-8541. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571)272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BRIAN SIRCUS
SUPERVISORY PATENT EXAMINER
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DJC

December 15, 2005